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No Further Action Decision Under CERCLA Study Area 51: O'Neill Building

Fort Devens Main Post Site Investigation Fort Devens, Massachusetts

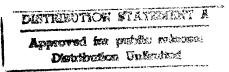
Prepared for:

U.S. ARMY ENVIRONMENTAL CENTER ABERDEEN PROVING GROUND, MARYLAND 21010

Prepared by:

ARTHUR D. LITTLE, INC. 25 Acorn Park Cambridge, Massachusetts 02140-2390

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Arthur D Little

FINAL

No Further Action Decision Under CERCLA

Study Area 51: O'Neill Building

Fort Devens Main Post Site Investigation, Fort Devens, Massachusetts

Submitted to

U.S. Army Environmental Center (USAEC) Aberdeen Proving Ground, Maryland

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Arthur D. Little, Inc. Acorn Park Cambridge, Massachusetts 02140-2390

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1	List of Acror	nyms and Abbreviations
2		
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5	•=	
6	BAF	Bioaccumulation Factor
7	BRAC	Base Realignment and Closure
8	CERCLA	Comprehensive Environmental Response, Compensation, and Liability
9		Act
10	CMR	Code of Massachusetts Regulations
11	DoD	Department of Defense
12	EMO	Environmental Management Office
13	Enhanced PA	Enhanced Preliminary Assessment
14	EPA	United States Environmental Protection Agency
15	IRP	Installation Restoration Program
16	MCP	Massachusetts Contingence Plan
17	MADEP	Massachusetts Department of Environmental Protection
18	MEP	Master Environmental Plan
19	MSL	Mean Sea Level
20	NPL	National Priorities List
21	PA	Preliminary Assessment
22	PCB	Polychlorinated Biphenyl
23	PCL	Protective Contaminant Level
24	PID	Photoionization Detector
25	PRE	Preliminary Risk Evaluation
26	PQL	Practical Quantitation Limit
27	NRIR	Non-Dispersive Infrared
28	SA	Study Area
29	SARA	Superfund Amendments and Reauthorization Act
30	SI	Site Investigation
31	SSI	Supplemental Site Investigation
32	TPHC	Total Petroleum Hydrocarbons
33	μg/g	Micrograms perm gram
34	USAEC	United States Army Environmental Center
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Executive Summary

Investigations of Study Area (SA) 51 - O'Neill Building at Fort Devens, Massachusetts, have resulted in the decision that no further studies or remediation are required at this site. SA-51 was identified in the Federal Facilities Aggreement between the U.S. Environmental Protection Agency and the U.S. Department of Defense as a potential site of contamination.

Fort Devens was placed on the National Priorities List under the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act on December 21, 1989. In addition, under Public Law 101-510, the Defense Base Closure and Realignment Act of 1990, Fort Devens was selected for cessation of operations and closure. In accordance with these acts and to support the overall mission of environmental restoration and base closure, numerous studies have been conducted that address SAs at Fort Devens, including a Master Environmental Plan (MEP), an Enhanced Preliminary Assessment (Enhanced PA), and Site Investigation Reports.

 SA-51 is located adjacent to the O'Neill Building, on the western side of Lovell Street, across from SA-11 and the Nashua River. The O'Neill Building Compound serves as a training center for the Intelligence School. Training operations are conducted using transmitting vehicles and generators at 12 gravel-covered pads.

The MEP and Enhanced PA originally identified in SA-51 as area between Pads 10 and 11 where a history of spills and removal actions have been documented. Approximately 15 gallons of diesel fuel were spilled in an area between Pads 10 and 11 as a result of a petcock left open on a mobile generator. During inspection of the spill area, evidence of additional contaminated soils was observed. According to the MEP and Enhanced PA, 200 cubic yards of soil was removed, but soils remained that showed evidence of contamination. Sample results reportedly showed 90 to 200 μ g/g of total petroleum hydrocarbons (TPHC). The SA was expanded to include all 12 pads to address the possibility that similar spill incidents had occurred at other pad areas.

The Site Investigation of SA-51 was completed in 1993 in conjunction with 12 other study areas as part of the Main Post Site Investigation. The Supplemental Site Investigation was completed in 1994.

No evidence of extensive or high-concentration petroleum contamination was observed during the investigation. The results of the investigation indicate that there is no TPHC contamination in ground water. The levels of TPHC and metals detected in soils indicate local areas of low-concentration petroleum contamination consistent with the historical use of the SA for diesel fuel-powered equipment. Based on the results of the preliminary risk evaluation, the detected levels of these analytes are not likely to pose an unacceptable risk to human health or the environment.

Executive Summary

On the basis of the findings at SA-51, there is no evidence or reason to conclude that
the use of SA-51 for training operations has caused significant environmental
contamination or pose a threat to human health or the environment. The decision has
been made to remove SA-51 from further consideration in the Installaton Restoration
Program (IRP) process.

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1.0 Introduction

This decision document has been prepared to support a No Further Action decision at Study Area (SA) 51 - O'Neill Building at Fort Devens, Massachusetts. The report was prepared as part of the U.S. Department of Defense (DOD) Base Realignment and Closure (BRAC) program to assess the nature and extent of contamination associated with site operations at Fort Devens. Under Public Law 101-510, the Defense Base Closure and Realignment Act of 1990, Fort Devens has been selected for cessation of operations and closure. An important aspect of BRAC actions is to determine environmental restoration requirements before property transfer can be considered. Studies at SA-51 were conducted to support this overall mission.

In conjunction with the Army's Installation Restoration Program (IRP), Fort Devens and the U.S. Army Environmental Center (USAEC) initiated a Master Environmental Plan (MEP) in 1988. The MEP consists of assessments of the environmental status of SAs, specifies necessary investigations, and provides recommendations for response actions with the objective of identifying priorities for environmental restoration at Fort Devens. SA-51 was identified as a potential source of contamination in the MEP (Biang et. al., 1992). On December 21, 1989, Fort Devens was placed on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA).

 An Enhanced Preliminary Assessment (Enhanced PA) (Roy F. Weston, 1992) was also performed at Fort Devens to address areas not normally included in the CERCLA process. In 1993, DoD, through USAEC, also initiated a Site Investigation (SI) of SA-51 along with 12 other SAs as part of the Main Post Site Investigation at Fort Devens. The Supplemental Site Investigation (SSI) was conducted in 1994. The Supplemental Site Investigation Report (Arthur D. Little, Inc., 1995) recommended No Further Action at SA-51.

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2.1 Fort Devens Description and Land Use

Fort Devens is located in Middlesex and Worcester Counties, Massachusetts, approximately 35 miles west of Boston, Massachusetts. Fort Devens is located in portions of four towns - Ayer, Harvard, Lancaster, and Shirley. Fort Devens currently covers approximately 9,280 acres, consisting of the Main Post, North Post, and South Post areas. Massachusetts Highway Route 2 crosses Fort Devens and separates the Main Post from the South Post (Figure 2-1).

The majority of the facilities at Fort Devens lie within the Main Post, located north of Massachusetts Highway Route 2. The Main Post provides all of the on-post housing, including over 1,700 family units and 9,800 bachelor units (barracks and unaccompanied officers' quarters). Other facilities on the Main Post include community services (e.g., the shoppette, cafeteria, post exchange, bowling alley, golf course, and hospital), administrative buildings, classroom and training facilities, maintenance facilities, and ammunition storage.

The South Post is located south of Route 2 and contains training areas, ranges, and a drop zone. The North Post abuts the Main Post to the north of West Main Street in Ayer. The principal activities on the North Post are the Waste Water Treatment Plant and the Moore Army Airfield.

The terrain surrounding Fort Devens includes rolling areas and wooded hills. Fort Devens is located in the Nashua River Basin, and approximately 8 miles of the river, running from south to north, lie within the reservation boundaries (Figure 2-1). Several lakes and ponds are located within Fort Devens. Land surface elevations within Fort Devens range from about 200 feet above mean sea level (MSL) along the Nashua River on the northern boundary to 450 feet above MSL in the southern portion of the installation.

Ayer, Harvard, Shirley, and Lancaster are zoned for residential, commercial, and limited industrial development. All have fewer than 7,000 residents.

2.2 Regional Geology

The surficial geology throughout most of Fort Devens is characterized by glacially derived unconsolidated sediments. A mantle of Pleistocene-age glacial till, outwash, and lacustrine (lake) deposits, ranging in thickness from a few inches to approximately 100 feet, blanket the irregular bedrock surface underlying Fort Devens. The glacial lake deposits consist chiefly of sand and gravelly sand. Post-glacial deposits consist mostly of river-terrace sands and gravels; fine alluvial sands and silts beneath modern floodplains; and muck, peat, silt, and sand in swampy areas.

The surficial deposits are underlain by a complex assemblage of intensely folded and faulted metasedimentary rocks with occasional igneous intrusions. Depth of bedrock ranges from approximately 100 feet to ground surface, where it outcrops at Shepley's Hill. Bedrock is primarily unweathered to only slightly weathered at Fort Devens, as is typical in glacial terrain.

2.3 Regional Hydrogeology

Fort Devens lies within the Nashua River drainage basin. The Nashua River flows south to north through the installation, and is the eventual discharge locus for all surface water and ground water flow at the installation. The water of the Nashua River has been assigned to Class B under Commonwealth of Massachusetts Regulations (CMR). Class B surface water is "designated for the uses of protection and propagation of fish, other aquatic life and wildlife, and for primary and secondary contact recreation" (314 CMR 4.03). The Nashua River and its major tributaries are shown on Figure 2-1.

Glacial outwash deposits constitute the primary aquifer at Fort Devens. Ground water also occurs in the underlying bedrock; however, flow is limited because the rocks have no primary porosity and water moves only in fractures and dissolution voids. Ground water in the surficial aquifer at Fort Devens has been assigned to Class I under CMR. Class I consists of ground waters that are "found in the saturated zone of unconsolidated deposits or consolidated rock and bedrock and are designated as a source of potable water supply" (314 CMR 6.03). Ground water provides the main source of potable water for Fort Devens. Ground water is pumped from three large-diameter and 74 small-diameter production wells.

2.4 Study Area Description and History

2.4.1 Study Area Description and Land Use

SA-51 is located adjacent to the O'Neill Building, on the western side of Lovell Street, across from SA-11 and the Nashua River (Figure 2-1). The O'Neill Building Compound serves as a training center for the Intelligence School. Training operations are conducted using transmitting vehicles and generators. The SA contains 12 circular gravel pads, identified on the site plan in Figure 4-1 by numbers 1 through 12. Eleven of the pads are used to park mobile vehicles containing equipment for Army personnel's training sessions. Pad 2 is currently the location of a bermed, concrete vehicle fueling and spill containment area with a drain and an oil-water separator.

personnel's training sessions. Pad 2 is currently the location of a bermed, concrete vehicle fueling and spill containment area with a drain and an oil-water separator. The vehicles are moved between pads, and typically only a few pads are in use at any one time. Pad 5 was being used to store old truck axles and other metal material at the start of this investigation. Some of the material was removed to allow site access for field sampling, and no evidence of surface staining was observed in the

storage area.

The site is currently used as a communications training area for the Intelligence School. The parcel has been designated as Transitional Use: Army Reserve Enclave according to the Devens Reuse Plan (Vangasse Hangen Brustlin, Inc., 1994).

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2.4.2 Background and Physical Setting

SA-51 was originally identified in the MEP and Enhanced PA as an area between Pads 10 and 11 where a history of spills and removal actions were documented. The SA was expanded to include all 12 pads to address the possibility that similar spill incidents had occurred at other pad areas.

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South Hospital (referred to as Lovell Hospital in the MEP and PA) was located on the site until 1972. Underground foundations and piping associated with the hospital may remain on the site. The site was vacant from 1972 until 1984 or 1985 when the Thomas R. O'Neill Building was constructed.

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Records of the Fort Devens Environmental Management Office (EMO), including the Memorandum of Record - Spill Clean Up at the O'Neill Building Compound dated April 9, 1990, indicate that on October 16, 1989, approximately 15 gallons of diesel fuel spilled from a petcock left open on a mobile generator on Pad 11. During the following investigation by the EMO, six additional areas of contaminated soil were identified on and between Pads 10 and 11. Five of these spills were fresh, small surface stains. One of the spills encompassed a much larger area.

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Four phases of excavation were completed at the spill sites. During excavation, a photoionization detector (PID) was used to measure volatile organics. Soil showing PID readings greater than 10 micrograms per gram (µg/g) was removed. Confirmatory soil samples were collected from the excavation and submitted to a laboratory for total petroleum hydrocarbons (TPHC) analysis. The confirmatory samples from the first three cleanup phases at several of the spill areas showed TPHC levels over 100 µg/g, which, according to EMO memoranda, was the Massachusetts Department of Environmental Protection's (MADEP's) action level at the time. Confirmatory samples from the fourth phase of excavation indicated that TPHC concentrations were below 100 μg/g.

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In addition to the cleanup activities described above, the EMO identified and excavated contaminated soil from Pad 3 in 1992. The excavation was filled with clean sand, and the excavated material is currently stored on Pad 2. Confirmation sample results were not available for review.

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According to Fort Devens' personnel and EMO memoranda, diesel fuel, lubrication oil, antifreeze, and transmission oils are materials used as part of the current site operations. No polychlorinated biphenyl (PCB)-containing fluid is reportedly used on the site.

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2.4.3 Geology of Study Area 51

The site is at an elevation of approximately 275 feet above MSL. Subsurface soils observed during the investigation were well sorted sands with some gravel. Based on area geology, this is interpreted as being a kame deposit. A layer of fill approximately 2 to 4 feet in thickness, consisting of poorly sorted sand and gravel, overlies the natural deposits. According to the *Detailed Flow Model for North and Main Posts*, Fort Devens, Massachusetts (Engineering Technologies Associates, 1994), bedrock is located at approximately 150 feet above MSL.

2.4.4 Hydrogeology of Study Area 51

The Detailed Flow Model reports the calculated ground water elevation in the glacial outwash (overburden) aquifer in this area at 222 feet above MSL, which is the approximate elevation of the Nashua River. Given the topographic relief between the river and SA-51, the ground water elevation is expected to be higher than that reported in the Detailed Flow Model. During ground water sampling operations at the site, the water table was estimated to be at approximately 40 feet below grade. Ground water flow in both the overburden and bedrock aquifers in this area is expected to be east, toward the Nashua River.

3.0 Site Investigation

3.1 Site Investigation Report

The SI was conducted from June to July 1993 in conformance with the Revised Work Plan Addendum for the O'Neill Building Site (Arthur D. Little, Inc., 1993a).

The scope of work for the SA-51 SI included the following activities:

- Review records and historical aerial photos and conduct interviews with Army's personnel.
- Collect soil samples from two depth intervals at 189 locations during two
 phases of work, as described below. All samples were analyzed for TPHC
 using a portable non-dispersive infrared (NDIR) spectrophotometer in a
 mobile laboratory established at Fort Devens.

Phase I - Soil samples collected at 0 to 2 feet and 4 to 6 feet beneath the gravel surface from 12 locations at each of 11 pads and five locations at Pad 2. Soil samples were also collected at four locations in a historical spill/cleanup area between Pads 10 and 11.

Phase II - Soil samples collected at 0 to 2 feet and 2 to 4 feet at seven locations around the perimeter of Pad 2 and an additional 41 locations around areas where Phase I data showed TPHC concentrations of greater than 50 μ g/g. The sampling depth was changed from 4 to 6 feet, to 2 to 4 feet because Phase I data generally indicated no contamination at 4 to 6 feet.

- Perform confirmatory sample analysis by DataChem Laboratories with approximately 10 percent of the total number of samples submitted for TPHC and target analyte list (TAL) metals analysis.
- Collect three ground water samples downgradient of identified areas of TPHC contamination for field laboratory TPHC analysis (five ground water sample locations were attempted, but samples could not be retrieved with the Geoprobe® unit from two of the locations).

The Final SI Report (Arthur D. Little, Inc., 1993b) presents documentation of methods and activities performed during the Main Post SI and discusses the results of the SI, including conclusions and recommendations for each SA.

3.2 Supplemental Site Investigation

Based on results of the SI, it was determined that additional samples were required to evaluate ground water quality at the SA. Because SI ground water TPHC screening was performed in a field laboratory, it was necessary to confirm the presence of

3.0 Site Investigation

TPHC in ground water using a USAEC performance-demonstrated laboratory. The Supplemental SI scope of work included collecting ground water samples from two locations using a Geoprobe® small-diameter collection system near the SI ground water sample location at Pad 8.

The SSI report (Arthur D. Little, Inc., 1995) presents documentation of methods and activities performed during the Main Post SI. No further action is recommended for SA-51.

Sampling locations from the SI and SSI are shown on Figure 4-1.

3.3 Preliminary Risk Evaluation

The criteria and guidelines used for screening risks in the preliminary risk evaluation (PRE) are described below. A complete summary of criteria and guideline values used in the Main Post SI PREs is presented in the Final SI Report (Arthur D. Little, Inc., 1993b) and the SSI Report (Arthur D. Little, Inc., 1995). Uncertainties associated with the risk evaluation methodologies are also discussed in the Final SI Report.

3.3.1 Human Health Soil Risk Evaluation Methodology

EPA Region III Risk-Based Concentration Table (1993). The United States Environmental Protection Agency (EPA) Region III has developed risk-based soil concentrations based on published reference doses and cancer potency slopes and "standard" exposure scenarios. The concentrations reported correspond to a hazard quotient of 1, indicating no risk of noncarcinogenic effects, or a lifetime cancer risk of 1 in 1 million, whichever is lower. Both residential and commercial/industrial health-protective soil guidelines are published by EPA Region III.

Massachusetts Contingency Plan (MCP), July 1, 1993. Categories of health-protective soil guidelines were established by the Massachusetts Department of Environmental Protection (MADEP, 1993) for use in the characterization of risk posed by disposal sites. For assumed future residential use, SA concentrations are compared to the Method 1 GW-1/S-1 category. The S-1 category indicates that the soil is accessible and that both child and adult frequency or intensity of use may be high. The GW-1 category additionally assumes the potential use of the ground water as a drinking water source. For assumed future commercial/industrial use, SA soil concentrations are compared to the GW-1/S-2 category. The S-2 category indicates high adult use of the area, and minimal use of the area by children. For chemicals with no soil guidelines, we have used reportable concentrations published in the MCP guidelines. It should be noted that although Method 1 standards are used for screening purposes in the PRE, Method 1 is strictly applicable to a disposal site if there is a standard for each oil and hazardous material of concern, and if the oil or hazardous material is present in and will foreseeably migrate only within ground water and soil.

3.0 Site Investigation

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3.3.2 Ecological Soil Risk Evaluation

Surface Soil Ecological Protective Contaminant Levels. The ecological criteria or guidelines used for comparison to detected concentrations in soils were derived from the ABB Environmental Services, Inc., Chronic Exposure Food Web Model (ABB Environmental Services, Inc., 1992). No state or federal standards or guidelines exist to evaluate potential effects due to the ingestion of food and surface soil by terrestrial organisms. In the 1993 SI Report for Groups 2 and 7 (ABB Environmental Services, Inc., 1993), ABB developed a food web model that derives protective contaminant levels (PCLs). The PCLs estimate the potential dietary exposure for several potential receptor species at Fort Devens, using published bioaccumulation factors (BAFs), dietary profiles, and ingestion rates for the indicator species. These PCLs are assumed to protect the most sensitive of the modeled indicator species (i.e., shorttailed shrew) from direct toxic effects and/or bioaccumulation-mediated toxic effects.



4.0 Contamination Assessment

4.1 Soil Sampling

A total of 376 samples were collected from depths between 0 and 6 feet at 189 locations across the site during the SI. All soil samples were analyzed in a field laboratory for TPHC. Confirmatory samples were selected from those samples showing the highest levels of TPHC, and submitted for laboratory analysis at a rate of 10 percent of the total samples collected at the site.

Concentrations of TPHC detected at the site ranged from non-detect to $608 \mu g/g$. Only 51 of the 376 samples exceeded $100 \mu g/g$ TPHC and only four of the samples exceeded $500 \mu g/g$. TPHC was below the practical quantitation limit (PQL) of $10 \mu g/g$ in almost 50 percent of the samples. Where contamination was detected, it was consistently within the upper 4 feet of soil, and in most cases, the highest concentrations were within the top 2 feet. TPHC concentrations in samples collected from the 4 to 6-foot interval were typically below the detection limit.

Results of TAL metals analysis are summarized in Table 4-1. Sixteen of the metals were detected above background levels. Results of the SI indicate the presence of isolated, small spills of petroleum product that, for the most part, are limited to the upper 2 to 4 feet of soil.

4.2 Ground Water

Three ground water samples were collected at the site during the SI and were analyzed for TPHC in the field laboratory. The sample locations were downgradient (east) of Pads 6, 8, and the historical spill area between Pads 10 and 11. Each sample location corresponded to areas where soil analyses showed the highest concentrations of TPHC.

TPHC was only detected in 1 of the 3 ground water samples. The ground water sample collected east of Pad 8 and analyzed in the field laboratory showed 5.7 mg/L TPHC. Two soil samples from Pad 8 had TPHC concentrations exceeding 400 μ g/g at the 0 to 2-foot depth interval. However, samples collected from these locations at 4 to 6 feet showed TPHC concentrations less than 10 μ g/g, suggesting that the higher surface concentrations were not leaching down toward ground water. At 1 location, the TPHC concentration of 317 μ g/g at 4 to 6 feet was slightly higher than the 224 μ g/g concentration at 0 to 2 feet.

During the Supplemental SI, two additional ground water samples were collected from Pad 8 to confirm the detection of TPHC detected in ground water by field screening methods. The two samples were submitted to a USAEC performance-demonstrated laboratory for TPHC analysis. TPHC was not detected.

4.0 Contamination Assessment

Although field laboratory analysis of ground water during the SI investigation	
indicated that TPHC may be present in ground water, Supplemental SI ground wa	ater
analysis by a USAEC performance-demonstrated laboratory did not show any	
indication of ground water contamination.	

5.1 Surface Soils

Only metals and TPHC were analyzed in soils for this SA. The detected analytes and their concentrations are listed in Table 4-1. Surface soil concentrations are compared to the lowest commercial/industrial soil criteria. However, the area is used as a training area, where individuals would only be exposed intermittently.

Inorganics. Inorganic analytes detected above background concentrations include: arsenic, barium, beryllium, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, vanadium, and zinc. Molybdenum was detected at 0.2 feet in 51B-93-01X, however, since there are no background data available, it cannot be determined whether concentrations detected are above background concentrations. In all cases other than arsenic and beryllium, the analytes were detected above background concentrations, but did not exceed the human health guideline.

Only two inorganic analytes exceeded the lowest commercial/industrial human health guidelines: arsenic and beryllium. Arsenic was detected at 38 μ g/g (sample number 51B-93-12X), which is somewhat higher than the MCP health-protective value of 30 μ g/g. However, it should be noted that the MCP value is quite conservative; it is the same as the residential guideline and is much lower than the EPA Region III commercial/industrial guideline of 310 μ g/g that applies only to noncarcinogenic effects of arsenic. Beryllium only slightly exceeded the commercial industrial criteria of 0.67 μ g/g with detects of 0.699 and 0.714 μ g/g (51B-93-35X and -42X). Because the area will continue to be used as a training area with limited access, human risk due to exposure to these levels of arsenic and beryllium are likely to be insignificant.

The background concentration and the soil PCL were exceeded for arsenic, barium, chromium, lead, and mercury. Because this area is a fenced urban habitat, and has paved areas, gravel pads, and only scattered trees and shrubs, and Fort Devens is surrounded by large expanses of high-quality habitat, it is not likely to be a locally significant wildlife habitat.

Organic Compounds. Only TPHC were analyzed in soils. None of the TPHC detections exceeded the MCP commercial/industrial criterion of 2,500 µg/g. As a result, it is unlikely that human contact with the soils in SA-51 will result in any adverse health effects. No ecologically protective soil criterion was available for TPHC with which to evaluate possible ecological risks from the detected levels.

5.2 Ground Water

During the SI, TPHC were detected by NDIR in one of the three ground water samples (Pad 8) at a concentration of 5.7 mg/L, exceeding the human health criteria of 1 mg/L. However, SSI laboratory analysis of two samples also collected from Pad 8 indicated that there is no TPHC contamination in ground water.

6.0 Conclusions

 No evidence of extensive or high-concentration petroleum contamination was observed during the investigation. The results of the investigation indicate that there is no TPHC contamination in ground water. The levels of TPHC and metals detected in soils indicate local areas of low-concentration petroleum contamination consistent with the historical use of the SA for diesel fuel-powered equipment. Based on the results of the PRE, the detected levels of these analytes are not likely to pose an unacceptable risk to human health or the environment.

No further action is recommended for SA-51, because of the restricted access to the site, which is enforced by fencing and security, and the plans for continued future use of the SA for Army training. These recommendations are based on the historical information regarding the use of the site, visual observations, and the results of sampling and analysis. The recommendations are also based in part on the results of a PRE.

7.0 Decision On the basis of findings at SA-51, there is no evidence or reason to conclude that the historical use of SA-51 for training operations has caused significant environmental contamination or poses a threat to human health or the environment. The decision has been made to remove SA-51 from further consideration in the Installation Restoration Program (IRP) process. In accordance with CERCLA 120(h)(3), all remedial actions necessary have taken place, and the EPA and MADEP signatures constitute concurrence in accordance with the same. MES C. CHAMBERS PRAC Environmental Coordinator **U.S. ENVIRONMENTAL PROTECTION AGENCY** JAMES P. BYRNE Date Fort Devens Remedial Project Manager [] Non-concur (please provide reasons for non-concurrence in writing) MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

D. LYNNE WELSH

Date

9/11/95

Date

Section Chief, Federal Facilities - CERO

M Concur

 [] Non-concur (please provide reasons for non-concurrence in writing)

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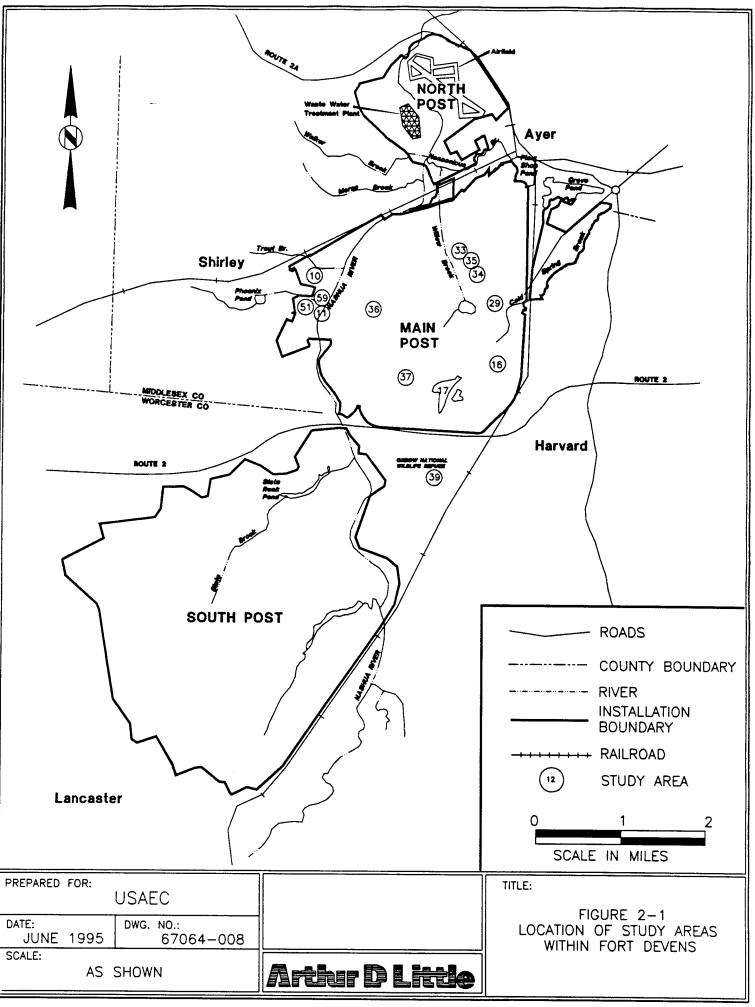
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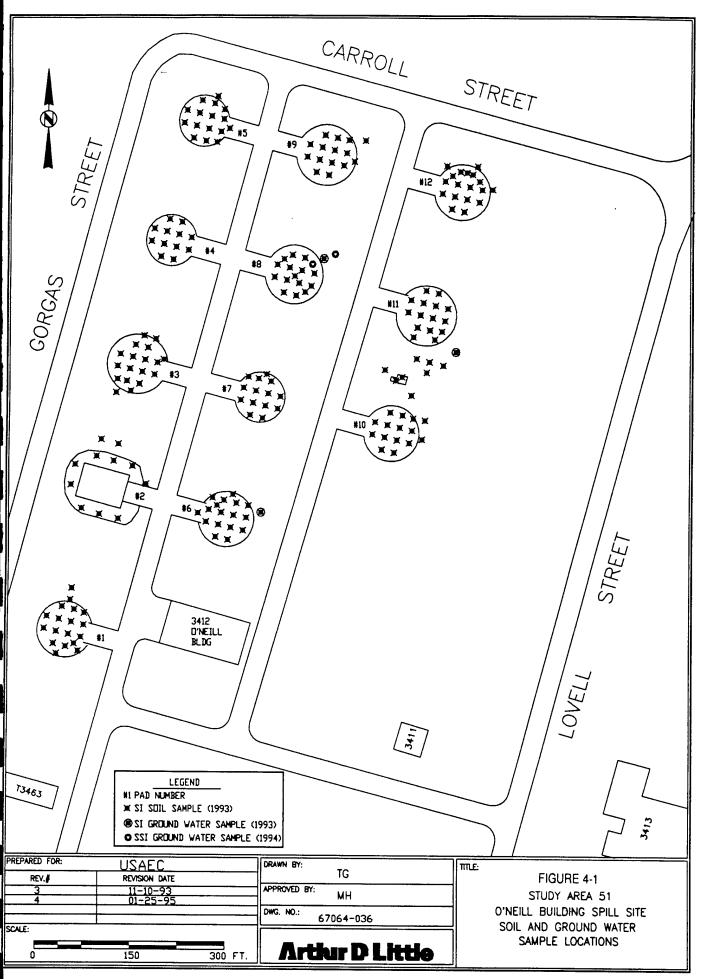


Table 4--1 Fort Devens Main Post Site Investigation Study Area 51 - Analytes in Soil

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Site ID	Ft. Devens	Commercial/	Ft. Devene Commercial/ Ecological 518-	51B-93-01X	51R.83.02X	618 83 037		3.00	г
Field Sample ID Sample Depth (ft)	Soil Background	Industrial Criteria	Surface Soil AMXGP01U Criteria 0-2	GP01U		516-15-05A AMKGP03U 0 - 2	516-83-04X AMXGP04U 0 - 2	51B-83-05X AMDGP05U	
								7	
lotal Petroleum Hydrocarbons (ug/g)	ŀ	2500	i	10 LT · · ·	10 LT · · ·	10 LT · · ·	10 [7		
Metals (ug/g)									_
Aluminum	15000	300000	1700	9650 · · E	9968	8190	7750 · · E	13000	
Arsenic	2	99	33	12.5	8.61	611	996	17.9	
Barium	42.5	72000	14	20.5	20.9	14.9	15.8	20°	
Beryllium	0.347	0.67	0.88	0.427 LT B · ·	0.427 LT B · ·	0.427 LT B · ·	0.427 LT B	0.427 ITB	_
Boron	;	92000	;	6.64 LT - · ·	6.64 LT · · ·		6.64 LT		
Calcium	1400	:	:	542	099	1650 B · ·	551	1310	
Chromium	3	2500	180	268 B - E	16.2	11	11.8	24.8	
Cobalt	;	5	S	6.11	5.46	3.58	10.4	7.32	
Copper	8.39	38000	8	12.9 B	7.08	5.23	6.43	14.9 B	
Iron	15000	;	;	25100 B · ·	12000	10300	10100	18200 8	
Lead	48.4	009	4	5.2 · · E	. · · · · · · · · · · · · · · · · · · ·	9.1 · · E	7.9 · · E	28	
Magnesium	2600	:	;	2930	2500	1780	1890	4240	
Manganese	00 00 00 00	5100	1500		158	123	155	222	_
Mercury	0.22	8	3.6	0.05 LT · · ·		0.05 LT · · ·	0.05 LT · · ·	13.4 B · E	
Molybdenum	;	5100	;	108	14.3 LT · · ·	14.3 LT - · ·	14.3 LT · · ·	14.3 LT	
Nicke	7	902	8	21.2 B	11.3	8.14		18.7 B	
Potassium	1700	ł	;		1230	- · · 9/9	757	1710 B	-
Selevina	1	2200	0.48	0.449 LT · ·	0.449 LT	0.449 LT - · ·	0.449 LT	0.45	_
Sodium	131	;	;	67.3	72.5	64.5		146 B	
Vanadium	28.7	7200	0	29.7 B - E	12.5 - E	10.5 · · E		204	
Zinc	35.5	5200	640	32.2	25.9	20.5	18.3	404	
) i	

Notes:
LT = Less than detection limit
ND = Not detected
B = above Fort Devens soil background
H = above human health criteria
E = above eco. surface soil criteria

Table 4--1 Fort Devens Main Post Site Investigation Study Area 51 - Analytes in Soil

	Ft. Devens (Ft. Devens Commercial/ Ecological 518-93-05X Soil Industrial Surface Soil AMXGP05U	Ecological Surface Soll	51B-83-05X ANXGP05U	518-93-06X AMXGP06U	518-83-07X AMXGP07U	518-93-08X AMXGP08U	51B-83-09X AMXGP09U
Sample Deput (11)	раскагопла	Criteria	Criteria	0.2	0-2	0-2	0.2	0.2
Total Petroleum Hydrocarbona (ug/g)								
Total Petroleum Hydrocarbons (ug/g)	:	500	1	009		<u>\$</u>	ę	ę
					į	3		
Wetnis (ug/g)	00031	00000	901					
Alominor.	300	20000	3 5	3	13100 E	9190 - E	8160 · · E	B890 - E
Arsenic		3	-	13.9	16.1	20.3	15.4	12.3
Barium	42.5	72000	4		31.4	24.8	27.4	19.4
Beryllium	0.347	0.67	0.88	0.427 LT B · ·	0.427 LT B · ·	0.427 LT 8 · ·	0.427 LT B · ·	0.427 LT B · ·
Boron	;	92000	:	6.64 LT · · ·	6.64 LT · · ·	17.1	11.2	11.7
Calcium	1400	:	ı	1570 B · ·	688	1020	1680 B	962
Сһготіит	31	2500	180	22.3	22.3	18.7	15.8	13.1
Cobatt	:	001	8	7.41	6.13	5.45	90.9	48.4
Copper	8.39	38000	8	16.4 B	10.5 8	22 B · ·	14.8 B	7.92
Iron	15000	;	;	15300 B · ·	17700 B · ·	14200	14300	12500
Lead	48.4	009	4	13.4 E	15.3 · · E	57 B · E	18.3 · · E	14.6 · · E
Magnesium	2600	:	:	3480	3630	2700	2650	2190
Manganese	300	5100	1500	191	188	153	223	136
Mercury	0.22	8	3.6		0:05 LT	0.05 LT · · ·	0.05 LT · · ·	0.074
Molybdenum	:	5100	;	14.3 LT · ·	14.3 LT · · ·	14.3 LT · · ·		14.3 LT · · ·
Nickel	4	90	8	B . 6.71	16.1 B	15.3 B	15.6 8	
Potassium	1700	;	;	1540	1400	1090	1150	828
Selenium	:	2500	0.48	0.449 LT	0.449 LT · · ·	0.449 LT · · ·	0.449 LT · · ·	0.449 LT
Sodium	131	;	;	168 B	75.6	110	110	85.3
Vanadium	28.7	7200	5	16.5 · · E	18 · · E	14.9 · · E	13 · · E	12 · · E
Zinc	35.5	2500	040	34.1	36.3 B · ·	72.6 B · ·	46.6 B · ·	27

Notes:

LT = Less than detection limit

ND = Not detected

B = above Fort Devens soil background

H = above human health criteria

E = above eco. surface soil criteria

Table 4--1
Fort Devens Main Post Site Investigation
Study Area 51 - Analytes in Soil

Site ID Field Sample ID	Ft. Devens (Pt. Devene Commercial/ Ecological 518-93-10X Soli Industrial Surface Soli AMX GP1011	Ecological Surface Soli	51B-93-10X AMXGP101	51B-93-12X	518-93-13X	518-83-14X	51B-83-15X
a	Background	Criteria	Criteria	0-2		AMAGP130 0-2	AMXGP14U 0 - 2	AMXGP15U 0 - 2
Total Petroleum Hydrocarbone (11g/g) Total Petroleum Hydrocarbone								
(6/An)	ı	2500	ı	16	78	37	340	10 LT · · ·
Metals (ug/g)								
Aluminum	15000	300000	1700	9970 - E	12900 · · E	5730 - E	T	Coro
Arsenic	21	8	8	14.7	38 B H E	991	91	1
Barium	42.5	72000	4	28.8	32.7		22.6	
Beryllium	0.347	0.67	0.88	0.427 LT B · ·	0.427 LT B · ·	0.427 LT B · ·	0427 1 T B	0.00 0.427 IT B
Boron	;	92000	;	6.64 LT - · ·	6.64 LT · · ·	6.64 LT · ·	6.64 IT	8.64 IT
Calcium	1400	;	;	1110	1100	872		748
Сһготіит	31	2500	180	16.1	28.7	14.5	26.7	1.5
Cobait	:	<u>5</u>	33	4.89	9.26	4.86	7.21	3.27
Copper	8.39	38000	8	6:59	14.5 B · ·	7.65	11,6 B	4.92
Iron	15000	;	;	12900	23300 B · ·	11200	20200	10200
Lead	48.4	009	4	17.9 · · E	19.6 · · E	6.07 · · E	9.56 · · E	16.6
Magnesium	2600	;	:	2100	6590 B · ·	3150	6210 B	1640
Manganese	900	5100	1500	285	288	156		117
Mercury	0.22	8	3.6			0.05 LT · ·	0.05 LT - · ·	0.05 LT · ·
Molybdanum	:	5100	;	14.3 LT · · ·	14.3 LT · · ·	14.3 LT	14.3 LT	
Nickel	7	90	8	12	28.8 8	17.1 B · ·	29.2 B	808
Potassium	1700	;	;	186	1420	669	1300	662
Selenium	:	2500	0.48	0.449 LT · · ·	0.449 LT - · ·	0.449 LT	0.449 IT	0.440
Sodium	131	1	;	7.67	73.6	38.7 LT	75.9	9 8 9
Vanadium	28.7	7200	5	14.4 · · E	19.4 · · E		16.3 E	
Zinc	35.5	2500	640	31,4	46.5 B	21.	35.2	21.9
								2

Notes:

LT = Less than detection limit

ND = Not detected

B = above Fort Devers soil background

H = above human health criteria

E = above eco. surface soil criteria

Table 4--1 Fort Devens Main Post Site Investigation Study Area 51 - Analytes in Soil

Site ID	Ft. Devene Commercial/ Ecological 518-83-16X	Commercial/	Ecological	51B-83-16X		51B-83-18X	51B-83-19X	51B-83-20X	518-93-21X
Field Sample ID Sample Depth (ft)	Soil Background	Industrial Criteria	Surface Soil Criteria	AMXGP16U 0 - 2		AMXGP18U 0 - 2	AMXGP19U 0 - 2	AMXGP20U	AMXGP21U
Total Petroleum									
Hydrocarbona (ug/g) Total Petroleum Hydrocarbons					-				
(8/8n)	;	2500	ı	10 LT		87	2000	370	10 LT · · ·
Metals (ug/g)									
Aluminum	15000	300000	1700	14800	ш .	10000 · · E	9270 · · E	11100	n
Arsenic	21	8	33	8.62		19.8	11.7	219 B · ·	13.5
Barium	42.5	72000	4	26.1	•	29.4	21.6	27	25.
Beryllium	0.347	0.67	0.88	0.552	. 8	· · B 66:0	0.427 LT B · ·	0.427 LT B	0.53 B
Boron	:	92000	;	12.3		11.3		12.3	6.64 LT · ·
Calcium	1400	;	;	3380		1220	1050	1530 B · ·	1130
Chromium	31	2500	180	21.1		22.7	21.8	17.2	17.5
Cobalt	:	5	20	6.53		7.22	6.3	5.08	757
Copper	8.39	38000	봈	18.2	8	15.3 B · ·	8.53 B ·	9.12 B · ·	14.4 B · ·
Iron	15000	1	:	16900	8	17700 B · ·	14200	14800	8 00261
Lead	48.4	009	4	12.7	ш .	21 · · E	14.9 · · E	17.1 · · E	18.6
Magnesium	2600	1	;	3220		3620	0660	2810	3310
Manganese	300	5100	1500	198		276	200		305
Mercury	0.22	8	3.6	0.05 LT		0.062	0.05 LT · · ·	0.05 LT - · ·	0.05 LT
Molybdenum	:	5100	:	14.3 LT		14.3 LT	14.3 LT	14.3 LT - · ·	14.3 LT · ·
Nickel	4	200	8	14.1	8	21.9 B · ·	17 B	14.6 B · ·	
Potassium	1700	;	:	1350		1530	1140	1210	827
Selenium	:	2500	0.48	0.449 LT		0.449 LT · · ·	0.449 LT	0.449 LT	II 6740
Sodium	131	1	;	959		143 B	82.4	87.5	75.4
Vanadium	28.7	7200	5	22.3	ш	16.4 · · E	16.1 · · E	15.3 · · E	14.2
Zinc	35.5	2500	9	35		41.4 B	31.3	32.2	30.3

LT = Less than detection limit
ND = Not detected
B = above Fort Devens soil background
H = above human health criteria
E = above ecc. surface soil criteria

Table 4--1 Fort Devens Main Post Site Investigation Study Area 51 - Analytes in Soil

Site ID	Pt. Devene	Pt. Devene Commercial/ Ecological 518-93-	Ecological	22X	518-83-23X	51B 82 24V	210 50 515	
Field Sample ID Sample Depth (ft)	Soil Background	Industrial S Criteria	Surface Soli AMXGP22U Criteria 0 - 2	720	AMXGP23U 0 - 2	AMDGP24U 0-2	51B-M3-24A AMXGP24U 0-2	518-82-25X AMXGP25U
Total Petroleum Hydrocartona (1970)								_
Total Petroleum Hydrocarbons		;						
(B.fbn)	:	2200	:	930		08	28	22
Metals (ug/g)								
Aluminum	15000	30000	1700	9860 - E	8850 - · E	8700	9698	08080
Arsenic	2	ଚ	8	12.6	10.1	11.4	801	13.3
Barium	42.5	72000	4	37.2	32.9		161	15.2
Beryllium	0.347	0.67	0.88	0.427 LT B · ·	0.427 LT B · ·		0.427 LT B · ·	0.427 ITB
Boron	;	92000	ı	6.64 LT - · ·	6.64 LT · · ·	6.64 LT	17 999	
Calcium	1400	1	ı	1470 B · ·	891	649	753	286
Chromium	E -	2500	8	23.9	17.6	13.8	13	18.4
Cooair	1	8	8	6.2	7.45	4.27	4.06	
Copper	8.39	38000	*	12.9 B	9.2 B · ·	8	9.42 B · ·	17.8 8
iron	0005	: }		17400 B -	11900	11100	14700	16700 8
Lead	48.4	009	4	62 B - E	170 B · E	40 · · E	ш · · · 88	17 · · E
Magnesium	2096	;	: !	3800	3120 · · ·	2010	5360	3330
Manganese	3 8	900	96	197	493 8	149	152	566
Melibdonim	0.22	3 5	3.6	0.05 LT		_	0.449 LT B	0.05 LT · · ·
Nickel	: ;	3 5	: §	14.3 []	14.3 LT · · ·	14.3 LT	14.3 LT	
Dotation	- ţ	3	3	8 61	B 6:02	10.6	12.5	21.7 B · ·
Colonia	3	: 0	1 .	1170	841	772	629	1120
Colenium	: •	2500	0.48	0.449 LT - · ·	0.449 LT - · ·	0.449 LT · · ·	0.449 LT · ·	0.449 LT
Enipos	131	:	;	76.3	71.6	53.9	38.7 LT · · ·	50.1
Vanadium	28.7	7200	9	19.6 - E	14.2 · · E	12.4 · · E	12.3	15.0
Zinc	35.5	2500	640	71.7 B · ·	128 B · ·	50 B ·	49.3 B	43.2 B

Notes:
LT = Less than detection limit
ND = Not detected
B = above Fort Devens soil background
H = above human health criteria
E = above eco. surface soil criteria

Table 4-1 Fort Devens Main Post Site Investigation Study Area 51 - Analytes in Soil

Site ID Field Sample ID Sample Dentit (ft)	Ft. Devens Soil Background	Ft. Devene Commercial/ Soil Industrial	Ecological Surface Soli	A-26X GP26U	51B-83-30X AMDGP30U	51B-83-30X AMXGP30U	83-31X GP31U	51B-83-32X AMXGP32U
(6/6)						2-0	0-2	0-2
(0/8)	ı	2500	1	13	021	170	710	330
Metals (ug/g)								
Aluminum	15000	300000	1700	8580 · · E	8480 · · E	8520 · · E	7910 E	11000
Arsenic	21	8	8	13.9	85.6	66.8	14.3	J
Barium	42.5	72000	14	19.1	23.1	21.9	17.3	7.70
Beryllium	0.347	0.67	0.88	0.427 LT B · ·	0.548 B · ·		0.427 LT B	0.427 ITB
Boron	:	92000	1		6.64 LT · · ·	6.64 LT - · ·		
Calcium	1400	:	1	162	303	429		
Chromium	31	2500	180	20.4	16.5	14.9	14.9	27.3
Cobalt	;	5	જ	5.24	4.59	3.92	6.22	
Copper	8.39	38000	8	11.8 8	8.02	7.35	11.8	16.5
Iron	15000	:	;	12900	11800	11500	14400	22600 B
Lead	48.4	009	4	17 · · E	18	20.2 · · E	田	18.6
Magnesium	2600	:	:	5850	2510	2230	2800	5760 B
Manganese	80	5100	500	243	133	128	181	292
Mercury	0.23	8	3.6		0.05 LT - · ·	0.449 LT B · ·		0.05 LT · · ·
Molyodenum	:	5100	1	14.3 LT · · ·		14.3 LT · · ·	14.3 LT · · ·	
Nickel	7	700	8	13.5	10.8	10.4	14.4 B	
Potassium	1700	1		813	986	628	298	1380
Selenium	,	500	0.48	0.449 LT · · ·	0.449 LT · · ·	0.449 LT · · ·	T	0.449 11
Sodium	131	1	:	70.1	38.7 LT · · ·	167		
Vanadium	28.7	7200	0	16.7 · · E	13 E	13.2 · · E	12.1	. u
Zinc	35.5	2500	040	29.3	26.2	27.7	26.6	42.6 B :
								1

Notes:
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H = above human health criteria
E = above eco. surface soil criteria

Table 4--1 Fort Devens Main Post Site investigation Study Area 51 - Analytes in Soil

Site ID	Ft. Devens	Commercial/	Ecological 5	518-83-33X	K18-01-24X	×30 00 00 00 00 00 00 00 00 00 00 00 00 0		
Field Sample ID Sample Depth (ft)	Soli Background	Soli Industrial Surface Soli AMXGP33M Background Criteria Criteria 0 - 2	Surface Solt	AMXGP33M 0 - 2	AMXGP34U		516-86-36A AMXGP36U	518-83-37X AMXGP37M
Total Petroleum								
Total Petroleum Hydrocarbons								
(6/6n)	;	2500	1	270	47	180	480	
Metals (ug/g)								
Aluminum	15000	300000	1700	10400 · · E	6480	14800 E	10500	L .
Arsenic	2	8	8	4.29		14.6	91.0	n
Barium	42.5	72000	4	40.7	25.8	G 6,49	· · · · · · · · · · · · · · · · · · ·	
Beryllium	0.347	0.67	0.88	0.606 B ·	0.427 LT B	Н В 669.0	0.594 B	2.C3
Boron	ı	92000	1	6.64 LT · · ·	6.64 LT · · ·	6.64 LT -	6.64 T	
Calcium	1400	:	:	· · 8 0806		2970 8	1150	
Chromium	<u>ء</u>	2500	8	21.1	9.1	58.2 B · ·	202	184
Cobalt	ı	8	S	5.43	4.65	6.77	4.7	5.7
Copper	8.39	38000	ह	10.5 B · ·	8.02	13.4 B	882 8	
Iron	15000	:	1	15100 B · ·	9140	13300	12100	15a00 B
Lead	48.4	009	-	330 B · E	340 B · E	60 B · E	550 B · E	u .
Magnesium	2600	:	:	2810	1730	4030	2460	2800
Manganese	000	9100	9	165	125	151	145	181
Mercury	0.22	8	3.6	0.114	0.05 LT · · ·	0.074	0.108	TJ 50:0
Molybdenum	:	2100	:	14.3 LT - · ·	14.3 LT	14.3 LT	14.3 LT	14.3 [1]
Z C C	7	700	8	91.1 8	8.2	22.4 B	114	•
Potassium	1700	:	;	1040	1380	2670 B	1070	0501
Selenium	: .	2500	0.48	0.449 LT · · ·	0.449 LT · · ·	0.449 LT · ·	0.449 LT · ·	0449 IT
Sodium	131	:	1	89.4	38.7 LT · · ·	241 B		
Vanadium	28.7	7200	9	16.2 · · E	9.33	21.6 · · E	16.6 - E	138
Zinc	35.5	2500	040	340 B · ·	122 B	38.9 B	101 B	451 B

Notes:

LT = Less than detection limit
ND = Not detected
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H = above houras health criteria
E = above eco. surface soil criteria

Table 4-1 Fort Devens Main Post Site Investigation Study Area 51 - Analytes in Soil

Site ID	Ft. Devens	Pt. Devens Commercial/	Ecological 51	51B-83-38X	100	18-83-39X	\$18.09.40Y	K10 00 11V	75, 55	
Field Sample ID Sample Depth (ft)	Soli Beckground	Industrial Criteria	Surface Soil AM Criteria 0 -	AMXGP38M 0 - 2	< 0	AMXGP39U 0 - 2	AMXGP40U	AMXGP41U	AMXGP42U	
Total Petroleum									7-0	-
Hydrocarbone (ug/g) Total Petroleum Hydrocarbons										
(6/6n)	ı	2500	:	110	•	140	140	10 LT · · ·	170	•
Metals (ug/g)										
Aluminum	15000	300000	1700	8320	ш.	10100	11700	11300	865	L
Arsenic	2	8	8	13.8	•	601	32.2	3	905	
Barium	42.5	72000	7	24.7	•	28.8	808		6.51	. ı
Beryllium	0.347	0.67	0.88	0.546 B -	•	0.536 B	0.645 B	0.63	8.24 E	٠ =
Boron	;	92000	;	8.45	•	6.64 LT	TT 999		1 1 2 2	
Calcium	1400	;	;	1780 B -	•	876	1290	1350	- 17 40:0	
Сhromium	3	2500	081	16.6	•	15.4		8 %	2 6	
Cobalt	1	<u>\$</u>	S	5.51	•	6.4	68.8	777		
Copper	8.39	38000	¥	8.94 B	•	9.46 B	17.6 B · ·	8 99	0.40	
<u>Fo</u>	15000	:		12300		21700 B	22200 B	17000 B	16700	
Lead	48.4	0 9	+	52 B -	ш,		38	791	250	. L
Magnesium	2600	;	ı	5030	•	2510	5810 8	3840	2500	ı,
Manganese	300	5100	1500	148	•	121	328 B	988	001	
Mercury	0.22	8	3.6	0.081	•		0.05 LT · · ·	17 000		
Molybdenum	:	5100	1	14.3 LT	•	14.3 LT	14.3 LT · · ·	_	11.67	
Nickel	4	90	8	12.2	•	13.4 1	30.6		3.5	
Potassium	1700	:	1	824	•	1170	1330	1360	200	
Selenium	:	2500	0.48	0.449 LT	•	0.449 LT · ·	0.449 IT	0.440	. 1. 0440	
Sodium	131	ı	1	73.5	•	109	691		. I 7 8 9 3	
Vanadium	28.7	7200	5	13.6	w ·	13.9	8.61	99	. 29.	, L
Zinc	35.5	2500	649	53.4 B -	•	30.6	90.4 B	20.00		u

LT = Less than detection limit
ND = Not detected
B = above Fort Devens soil background
H = above human health criteria
E = above eco. surface soil criteria